SOUTH PACIFIC COMMISSION
The Diet of Mothers and Children on the Island of Guam
Malcolm (SA)

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3955

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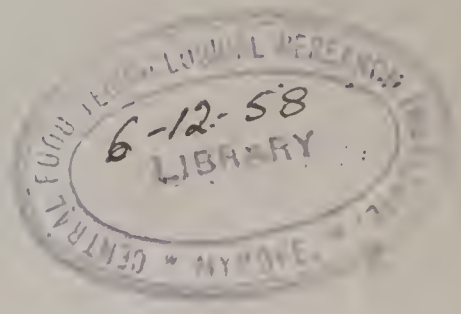
3955
Diet of mothers

Technical Paper No. 113

THE DIET OF MOTHERS AND CHILDREN ON THE ISLAND OF GUAM

SHEILA H. MALCOLM



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South Pacific Commission
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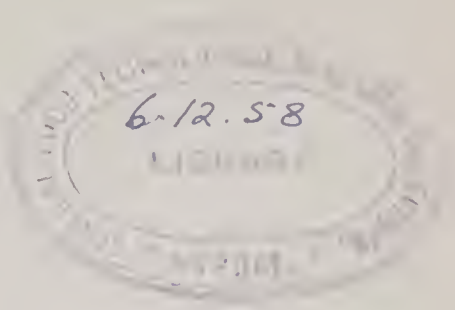
SHEILA H. MALCOLM

Dietician-Nutritionist
Food and Agriculture Organization

on assignment to the
South Pacific Commission



South Pacific Commission
Noumea, New Caledonia
January 1958

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Diet of mothers.

PREFACE

During her 1956 assignment by the Food and Agriculture Organization to the South Pacific Commission, it was agreed between the two organizations that Miss Sheila H. Malcolm, dietician-nutritionist, would spend three to four months on Guam to investigate and advise on conditions relating to the nutrition of mothers and young children of the Guamanian population.

Miss Malcolm has been working in this field of research during the past seven years. She has visited most of the Pacific island territories and over the years her approach to this difficult problem in rural and sometimes primitive communities has considerably improved. Miss Malcolm's methods and techniques, checked in various places, are now well suited to her work in the field.

On Guam, nevertheless, Miss Malcolm faced living conditions very different from what they are in other Pacific islands. The American way of life strongly appeals to the population and a cash economy has developed, though one still finds customs and habits of the original and successive foreign cultures which have influenced the development of the country.

The population is undergoing a rapid evolution. Its full development requires a modern understanding of the various aspects of all problems.

The improvement of the dietary standards and nutritional status of all groups in the population is related to the achievement of a sound economy, the development of appropriate systems of soil cultivation, farming and husbandry, and proper education.

These are no doubt objectives of those responsible for Guamanian affairs. There is effective co-operation among all concerned, and the various agencies of government work together, adjust their policies, and translate into everyday practice the combined results achieved.

The people also play a responsible part. Their role is of major importance, and the efforts of all would be useless unless supported by the key person in controlling her family's diet - the mother.

The development of Home Economics Services on Guam, as recommended by Miss Malcolm, should receive earliest attention. Of course the availability of adequate foods, whether locally produced or imported, is the basis for a sound diet and a good nutritional status. But in a modern wage economy, particularly in a young one, the housewife must be able to earmark the amount of money which is necessary daily to feed her family, select with great care

the most nutritious and varied foods she can afford to buy, and use the shopping facilities and the amenities of her kitchen to prepare attractive and palatable meals.

Over the years, a reasonable knowledge has been gained of food resources, dietary patterns, and nutritional status on Guam. The stage has now been reached when an overall practical application can be attempted.

The Governor of Guam recently wrote to the Secretary-General, South Pacific Commission:

> "I am happy to inform you that certain recommendations in the report are already in effect and we contemplate initiating programs to effectuate the remainder".

This is the proof - if it were needed - that Miss Malcolm's efforts have been worth while and that her recommendations are sound.

Dr. E. Massal
Executive Officer for Health

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THE DIET OF MOTHERS AND CHILDREN

ON THE ISLAND OF GUAM

ASSIGNMENT

The Governor of Guam. at the suggestion of his Public Health Department, requested the South Pacific Commission to make available the services of a dietician-nutritionist for a short period in order to investigate and advise upon conditions relating to the nutrition of mothers and young children of the Guamanian population. The study was to include consideration of weaning practices and procedures among the population. It was also desired to investigate an apparently excessive prevalence of gastro-enteritis in young children and to make any comparisons which seemed of interest with population groups already studied in other parts of the Pacific. The survey took place during the months of September, October and November 1956.

I: CONDITIONS ON THE ISLAND OF GUAM

The island of Guam lies north of the Equator and at the southern end of the Mariana Group of islands. It is a tropical volcanic island. The climate, governed by the monsoon season, tends to be dry in the first half of the year and is subject to heavy rains in the second half. The average annual rainfall is of the order of 70 inches. The annual temperature range of 72° - 88° F shows an annual mean of 81° F, with a somewhat high humidity.

History and Present Conditions

Guam was discovered by Magellan in 1521 and became a formal Spanish possession in 1668. At the end of the 19th century it came under U.S. Naval control. It was occupied by the Japanese in 1941-1944 and re-occupied by the United States after this period. The civil population is now under the jurisdiction of the U.S. Department of the Interior, and has a local legislature and an administration largely Guamanian assisted by

specialist officers from overseas.

The original Chamorro population inter-married with Spanish, Mexican and Filipino soldiers of early days. Varied contacts with outside people and cultures took place along the centuries. The influence of foreign cultures (Spanish, American, Japanese) have had a marked influence on the character and habits of the native population. At the present time a large U.S. Naval station greatly influences the way of life through contact employment and military service.

Most children attend either government or mission primary schools. A high school provides secondary education. Further opportunities in education are limited to those able to travel to Hawaii or to the United States.

Although English (American) is the official language, Chamorro is still commonly spoken.

Population Distribution, Occupation and Income

This report concerns only the Guamanian civil population, numbering 31,913 (census estimate, mid 1956). There are in addition to these, and the U.S. Armed Forces, some 5,600 others, mostly U.S. civilians, and Filipinos.

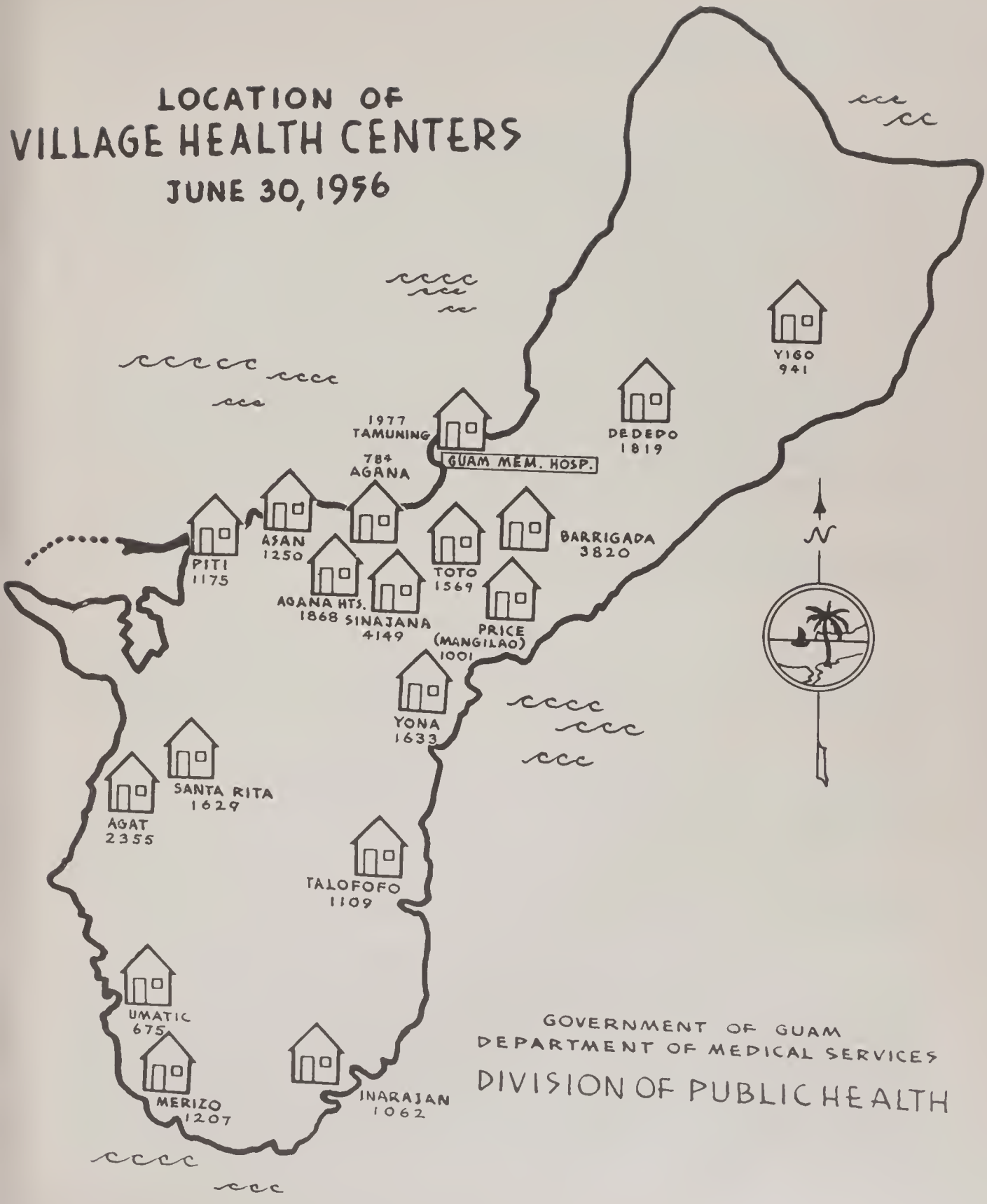
The bulk of the people live in and around the urban centre of Agana (see map opposite).

The family is the group unit. By mid 1956 there were 5,687 families, averaging 5.61 persons each. Large families of 8 or more are quite common.

The number of able-bodied males between 18 - 60 years of age was estimated at 7,615. The 1956 census shows 7,846 Guamanians employed by military, government or private agencies, 1,477 being females. Another 542 were classified as "bona-fide" farmers.

Of the 1,486 persons employed by the government, few receive less than $2,000 per year, and about 300 receive over $4,000 annually. The income of part-time workers who farm during the dry season, full time farmers, and civilian workers is more difficult to estimate, but it can be said that there is a wide range of income and that many people on the island are wage earners including women. Fifty-eight (58) families were receiving charity at the time of the census.

At least one member of the 15 families visited in the country municipality of Merizo and of the 20 families visited in the semi-urban municipality of Dededo, was receiving wages. Examples of occupations were: police officers, firemen, self-employed carpenters, self-owned business as store or garage, mechanics and heavy equipment operators employed by the Government or Navy, accountants, electricians, plumbers, welders, stevedores. Some of these occupations were carried out by part-time fishermen or farmers.


LOCATION OF
VILLAGE HEALTH CENTERS
JUNE 30, 1956
1977
TAMUNING
784
AGANA
GUAM MEM. HOSP.
DEDEDO
1819
YIGO
941
ASAN
1250
PITI
1175
AGANA HTS.
1868
SINAJANA
4149
TOTO
1569
BARRIGADA
3820
PRICE
(MANGILAO)
1001
YONA
1633
SANTA RITA
1629
AGAT
2355
TALOFOFO
1109
UMATIC
675
MERIZO
1207
INARAJAN
1062
GOVERNMENT OF GUAM
DEPARTMENT OF MEDICAL SERVICES
DIVISION OF PUBLIC HEALTH

Thus a large proportion of the population lives under urban or semi-urban condition and on a wage economy. The number of females working for wages is rather high for a Pacific island.

Foods Available, Markets and Stores

Many families (31 out of the 35 visited), either own, rent, or lease land from the Government. The amount of food grown seemed to depend on the enthusiasm of the family, on the time available to its members, and on the proximity of land to dwellings. Other factors such as joint ownership of land may also play a part. It must be recognised that October and November (i.e. the survey period) are wet months when farming activities are reduced to a minimum. Nevertheless it was noted that there was comparatively little home-grown produce entering houses at the time of the visits.

The value of locally-produced food was estimated by the Department of Commerce to be between $2,000,000 and $3,000,000 annually. Another estimate of local production was placed at 15% of the island's total requirement. This figure is most difficult to arrive at, and is further complicated by the fact that many farmers have contracts with the military forces, whose supplies are not considered in these figures.

Commercial statistics show that of approximately $21,000,000 expended annually on imports, one third is spent on food. A summary of imports for civilian population is given below.

TABLE I

Foodstuffs	344,035 cases	Cornmeal	2,940 bags
Sugar	37,545 bales	Chicken feed	53,839 "
Coffee	11,139 cases	Frozen meat	13,016,829 lbs
Milk	73,941 "	Frozen fish	1,178,806 "
Flour	38,430 bales	Fresh vegetables	791,468 "
Rice	87,795 sacks	Fresh fruits	1,166,155 "
Soft drinks	21,836 cases	Beer	354,977 cases

The form of these returns indicates only the broad position, as the net weights of food supplied in containers is not known. "Foodstuffs" means mixed groceries. The large amount of imported frozen meat is notable.

A visit was made to the farmers' market situated at Agana. A wet day and the seasonal drop in production affected the amount of produce available. The variety, however, was wide, including bananas, egg plant, peppers, string beans, pumpkin tips, melons, taro leaves, pumpkin and squash, taro, pomegranates, shelled lima beans, green gram, peanuts, papaya, sweet sop, sour sop, tomatoes, kangkung (Ipomoea aquatica), coconuts, sugar cane, spring onions, lemons, bean tips, pumpkin flowers, custard apples, banana flowers, mango (from Tinian or Saipan), sweet peppers, hot peppers, cucumber, breadfruit, guava, sweet potato and sweet potato tips and fresh local beef.

At the two municipalities visited there are no local markets but there are a number of small stores. A few local fresh fruits and vegetables were sometimes offered for sale at Merizo, but the amount of local fresh foods for sale seemed negligible.

Display of food in the stores was not so extensive as that of the Agana stores, but nevertheless the range was wide. As stated there were very few local fresh products for sale at the municipal stores visited, and demand for imported fresh vegetables and fruits was apparently low, partly because of the price, partly because of preference for carbohydrate or protein foods.

Cost of Living and Living Standards

A cost of living index compiled by the Department of Commerce in 1956 was based on a wage economy and the assumption that all foods and goods necessary would be purchased. This assumption is confirmed by the findings of this study. The index is designed to show rise and fall of living costs rather than actual budgeting but it has been based as far as possible on the way the income of an average family of 5 persons is spent. On an income of $2,878 the sum of $1,296 was allowed for the purchase of food. As many families have more than 3 children, it frequently occurs in this study that 60% or more of the income was spent on food.

All but a very few houses visited, both in Dededo and Merizo, had piped water.

Electricity was laid on to all but one of the houses visited in Dededo. With this one exception, all the houses had a refrigerator, an electric iron and nearly everyone an electric stove and radio. Electric fans. washing machines, hot plates, deep freeze cabinets were also common appliances, and six houses out of twenty had television sets.

In Merizo electricity is expected shortly. Meanwhile, quite a number of houses have electricity supplied by small private plants and used mostly for lighting. Radios, electric irons, stoves, refrigerators and washing machines are fewer than in Dededo. Most houses visited had kerosene burners or primus type stoves. A few had kerosene refrigerators.

Nearly every family owned a motor vehicle of some description, from a jeep to a new model Chevrolet or Ford.

Time payment is often used as a method of purchase by a population subjected to fairly high-pressure advertising propaganda.

It is not unusual to find a wood fire in the back yard, perhaps set on a concrete or tin platform for boiling or baking food as in the old days. This can also be termed a barbecue and is once more modern style! An outdoor old-style Guamanian oven was seen in the back yards of a few country houses. The base is a large square of brick or cement on which is built a hollow beehive shaped oven with a small fire aperture. After firing the oven, the fire is withdrawn and food baked by stored heat.

One can see clearly why such a cooking method requiring long time and labour has been almost discarded except for fiestas or special occasions when large quantities of food must be cooked. It was noted that many recipes used at present call for boiling, frying, braising or steaming over a flame rather than baking, and the impression was that the ovens of the electric stoves were not used to maximum capacity. Again the availability of all types of breads, cakes and pastries rather tends to discourage cooking skills.

Housing

Housing standards are in contrast to all these facilities. Though Quonset huts and cement are sometimes used for construction, frame houses are most usual. Some are roughly built and uncomfortably small for the large families, frequently making separate rooms even for parents and children difficult. Plumbing in general, including toilet facilities, has not changed so rapidly as other aspects of Guamanian life. Houses are not often planned to save labour, or to facilitate easy housekeeping and cleanliness. Some newly-married couples or those unable to find the capital to build for themselves, buy Quonset huts as a temporary measure. Though there are a few new and better-planned houses being built, the housing generally gives the impression of temporary construction. Dwellings are often built rather close together depending on the size of the block of land purchased, which sometimes has a rather small frontage. There is evidence of street planning in the newer municipalities. Gardens are usually carefully tended. A few fruit and coconut trees are grown and sometimes a few vegetables.

II: STATISTICS AND A SUMMARY OF INFORMATION AVAILABLE RELATING TO CONDITION OF MOTHERS AND INFANTS

Hospital and Public Health Facilities for Mothers and Children

The hospital facilities include a 160-bed hospital, including maternity and paediatric wards. Each municipality is also provided with a public health centre having a public health nurse in charge. It is part of her duty to visit every newborn child, and to encourage the mother to attend the regular well-baby clinics. There the child may be weighed, and examined, and advice on infant care given. In order to guide her work the public health nurse is supplied with "standing orders" relating to approved management and feeding techniques. Special emphasis is laid on the encouragement of breast feeding up to one year, provided the mother is healthy and has an adequate supply of milk. Should a nurse encounter difficulty she refers the case to the public health doctor who holds regular clinics at the municipal health centres.

Vital Statistics and Mortality in the First Year of Life

Records from the centres were available and referred to for statistical data. As is the case elsewhere the regularity of clinic visits diminishes rapidly in the second and subsequent years.

TABLE 2: Vital Statistics for the Period 1st July 1955 to 30 June 1956
(Figures supplied by Vital Statistics Section, Department of Medical Services. Government of Guam)

1.	Total civilian population (Guamanian and other)	37,419
2.	Death rate per 1,000 population	5.3
3.	Total number of births	1,441
4.	Birth rate per 1,000 population	38.9
5.	Infant mortality rate	38.86
6.	Total stillbirths	23
7.	Total abortions notified	154
8.	Mortality rate in 1-4 age group	.21

The above figures show a high birth rate and a low mortality rate.

The figures for infant mortality rate, stillbirths and abortion are high. of 52 infant deaths, of which the cause is given and which occurred in the period under review, 32 are the result of prematurity or conditions present at birth, 7 are due to pneumonia, and 5 to gastro-enteritis. "By far the highest ranking cause of death in all groups is prematurity. All reported cases of prematurity died within one month of age, most of them within hours or a few days after birth. Prematurity is also reported as the leading cause of foetal deaths (stillbirths). There is reason to seek the

cause of these many premature deaths in a too short interval between pregnancies".

The Spacing of Infants

An effort was made to obtain further information on birth spacing. Records kept in municipal books were examined; all birth dates were taken over the 1920-1956 period. The figures shown in the books may not be complete but appear to be fairly accurate. The reason for incompleteness is that the names of members of a family dying or departing are removed from the lists.

From 390 women in Dededo and Merizo there were records of 1833 children in the period, giving a mean of 4.7 children per woman. It appeared that children were more closely spaced from 1946 to 1956, but this may be partly due to the more stable conditions prevailing during this period, together with the fact that children born between 1920 and 1930 may have moved from the municipality and had their names removed from records.

TABLE 3: Spacing Between Births

Period between births	9-21 months	22-36 months	37 months-6 yrs.	over 7 yrs.
From 1920 to 1945	180	240	117	28
From 1946 to 1956	481	251	104	33
Total	661	491	221	61

In other Pacific islands it is rather rare to find spacing of less than 21 months between births. In Guam more than half the births occurred within that period. A break-down of the 661 births within the 9-21 month period showed that 16% occurred within a year of the previous birth, 30% in the 13-15 month period, 29% in the 16-18 month period, and 25% in the 18-21 month period. Clearly if the occurrence of pregnancy is an indication for the cessation of breast feeding, a large number of infants will be weaned before the end of the first year of life, and many a good deal earlier.

Growth and Devemopment of Infants and Young Children

Weight and height figures were taken from well-baby clinic continuous records at the municipal health centres of Dededo, Merizo and Barragada. The records used cover the period 1953 to 1956. They are reasonably accurate, although all measurements for each particular child were not made on the same day each month, because of irregular attendance of some mothers. Adjustment in the selection of records was therefore necessary.

A total of 1,099 weight and 721 height figures, covering 241 individual children, was taken from municipal health centres records. The exact

date of each weighing was known. There were not so many heights recorded as weights, but those corresponding to the weight records used were selected.

A quite large number (864 collected during 1956) of reliable birth weights were available from the obstetric ward of the Guam Memorial Hospital. These latter gave the following results.

TABLE 4: Birth Weights

(From 864 full-term born alive Guamanian children, twins excluded: mothers came from various municipalities).

Sex	Number	Minimum weight lbs. oz.	Maximum weight lbs. oz.	Mean weight lbs. oz.
Male	437	4 - 5	11 - 7	7 - 7
Female	427	4 - 8	10 - 12	7 - 3

From the municipalities' health centre records, the mean birth weight of 123 males was 7 lbs 4 oz. and of 114 females, 7 lbs 3 oz.

It is interesting to note that the mean birth weight of Guamanian children is high when compared with figures recorded in other Pacific islands, with the exception of the Samoas. Scragg in Rabaul (New Britain) and in New Ireland, recorded the following birth weights: males, 5.69 lbs, females, 5.87 lbs. The difference is probably not due to the height and build of Guamanian women who are approximately 5 feet in height and slight in build in adolescence and early adulthood. It will be seen later that the group of mothers studied had a diet comparatively high in animal protein for a Pacific island. Though the protein intake of Rabaul and New Britain mothers is not known, it is doubtful whether it is as high and as varied as that of the Guamanian mothers. The intake of other nutrients may be on the other hand better balanced in New Britain and New Ireland mothers, whose height and weight are not significantly different from the Guamanians. There might be some relation therefore between the protein intake of the pregnant women and the birth weight of the children, other conditions being somewhat similar.

Growth and Development

The following figures were taken from the municipal health centres' records:

TABLE 5: Weight and Height of Guamanian Children During the First 15 Months of Life

Ages (months)	Birth	1	2	3	6	9	12	15
Weight								
Males:								
Number	123	48	79	102	95	74	20	50
Mean weight in lbs & oz.	7.4	9.6	10.11	12.10	15.14	18.9	19.5	23.12
Females:								
Number	114	39	66	76	95	65	34	19
Mean weight in lbs & oz.	7.3	8.13	10.3	11.12	15.6½	16.11	18.1	19.4
Height								
Males:								
Number	15	46	64	90	91	60	43	
Mean height in inches	19	20½	22	23	25	28	29	
Females:								
Number	8	34	50	63	76	52	29	
Mean height in inches	18½	20	20½	24	25	26½	28	

Note: The numbers shown do not necessarily refer to different children. The total number of children referred to in the above Table was 241. There were 1099 weight, and 721 height records available for this group.

Both male and female double their birth weights at 6 months but neither trebles them at 12 months. When compared with the weights recorded in New Britain and in New Ireland (males at 6 months 15.3 lbs, at 12 months 18.01 lbs; females at 6 months 14.31 lbs, at 12 months 17.05 lbs.), the weights of the Guamanian children are somewhat higher.

The diet of the infants in Guam and in New Britain and New Ireland is very different. The New Guinea infants are breast fed for a period of 12

months or more and supplementary foods are generally of local origin. Breast milk is practically the only milk available. In Guam, the number of children receiving cow's milk, either with breast milk or alone, from birth or during the first 3 months is very high; many infants are weaned at the age of 3 to 5 months. Besides cow's milk these infants receive canned baby foods, eggs, and a variety of local or imported foods.

The Guamanian infant does not increase in weight as rapidly as the New Guinea infant during the first six months of life, but he gains weight steadily. The difference of weights is not as pronounced at 6 months as it is at 12 months.

Many other factors besides food affect the growth of infants in the first year of life, but the comparison made is rather interesting.

Growth of the Guamanian Infant in Relation to its Weight at Birth

The range of birth weights of full term children (i.e. those who could suck and did not require special care after birth) in Guam, varied from 4 lbs 5 oz. to 11 lbs 7 oz. To compare growth and development in relation to this wide variation of weight at birth, a table (Table 6 below) has been made, showing increasing weights and heights for infants whose birth weights were classified within the 3 following groups:

(a) 4 lbs 8 oz. - 6 lbs 8 oz.

(b) 6 lbs 9 oz. - 8 lbs 8 oz.

(c) 8 lbs 9 oz. - 10 lbs 8 oz.

Sexes have not been considered separately.

TABLE 6: Increases in Weight and Height for Different Birth Weights

Age (months)	Birth	1	2	3	6	9	12	15
A. Weights (lbs & oz.)								
Birth weight between 4 lbs 8 oz. and 6 lbs 8 oz.								
Number	74	23	48	55	51	38	25	15
Mean weight	6.2	7.13	9.4	11.4	14.6	16.4	18.7	20.0
Birth weight between 6 lbs 9 oz. and 8 lbs 8 oz.								
Number	140	45	86	102	108	89	53	22
Mean Weight	7.8	9.5	10.13	12.8	15.11	17.13	19.9	21.10
Birth weight between 8 lbs 9 oz. and 10 lbs 8 oz.								
Number	23	14	11	16	20	12	5	
Mean weight	9.7	10.12	12.14	13.12	17.13	19.12	22.4	

./..

TABLE 6 (Ctd.)

Age (months)	Birth	1	2	3	6	9	12	15
B. Heights (in inches)								
Birth weight	between 4 lbs 8 oz. and 6 lbs 8 oz.							
Number	11	23	32	48	48	29	21	
Mean height	18½	19	20½	22	24½	26	28	
Birth weight	between 6 lbs 9 oz. and 8 lbs 8 oz.							
Number	10	44	73	96	100	72	48	
Mean height	21	21½	21½	23	25	27	29	
Birth weight	between 8 lbs 9 oz. and 10 lbs 8 oz.							
Number	2	13	9	15	18	12	4	
Mean height	21	22	22	24	25	26	29	

There is a pronounced difference in the mean weight of the infants in the 3 groups at 6, 9 and 12 months. The mean weight of the two lower groups more than doubled at 6 months, while the mean weight of the higher group did not. At 12 months only the mean weight of the lowest group trebled.

Growth and Development During the First Five Years of Life

Clinic attendance at the municipality health centres drops sharply from 12 months on. The numbers were insufficient to make a mean for each sex for weights and heights in the first five years.

Figures recorded are as shown below:

TABLE 7: Average Weights and Heights - Both Sexes - Birth to Five Years

Age (months)	Birth	1	2	3	6	9	12	24	36	48	60
Weights (lbs - oz.)											
Number	237	87	145	178	179	140	84	62	18	14	10
Mean weight	7.4	9.1	10.8	12.4	15.9	17.11	19.3	23.7	31	35	37
Heights (inches)											
Number	23	80	114	153	167	112	72	46	18	10	10
Mean height	20	20½	21	23	25	27	29	31	36	37	41

Gastro-Enteritis

This is described in the Guam Medical Report as follows: "Gastro-enteritis is diagnosed as 'acute watery diarrhoea', in most cases accompanied by a moderate rise in temperature of 100-103°. Often the stools contain mucus or pus, rarely blood. No specific cause like paratyphoid, entamoeba histolytica, Shiga-Kruse's bacilli or other bacteria of the Salmonella group has been found by stool examinations. The disease mostly occurs in young infants of 1/2 - 1 year old and is often accompanied by vomiting and quickly leads to dehydration and emaciation".

In the hospital records for the period July 1954 - June 1955, of 1161 admissions to the paediatric section, there were 342 cases of enteritis and gastro-enteritis, this being by far the greatest single disease necessitating hospitalisation. Comparable figures for the succeeding year are not available but it is understood that the position had improved in 1955-56.

The public health section made an independent study of the problem as it appeared from mid-1954 to mid-1956. Of a total of 467 cases at all ages brought to their notice, 299 occurred in the July 1954-June 1955 period and 168 in the July 1955-June 1956 period. The study further showed that over 30% of the cases occurred between the ages of 7 and 12 months. Few patients were seen in the first 4 months of life. Cases increased rapidly after the 5th month. In total 41% of the cases occurred in the first year of life and 64% before the age of 3.

The period of 4 to 12 months corresponds to the time when breast feeding frequently ceases or is supplemented by formula feeding, and new supplementary foods are introduced. There did not seem to be sufficient reason to ascribe this condition to particular foods, but rather to the introduction of mixed feeding into a digestive tract unused to it and the use of contaminated food arising from defective environmental sanitation, defective personal hygiene and food contamination. The dangers are enhanced by a warm moist climate which accelerates breeding of bacteria and flies. It was noted that areas which gave greater attention to sanitation had fewer cases.

Note on Dental Decay in Children

The annual report of the Guam Hospital gives some information on this subject. The dental condition of school children and children in lower age groups has been surveyed and reported by the dental surgeon concerned as being poor. It was felt that the diet containing a high proportion of refined carbohydrates and low intake of fresh fruits and vegetables might play a part in this situation. Statistics show that there has been a marked increase of dental decay since the war. The diet at the same time changed from products of subsistence agriculture to its present high proportion of refined and canned foods. Preventive dentistry includes teaching the purpose of balanced diet, and proper dental hygiene by accepted mediums. It is interesting to note that the per capita consumption of bottled soft drinks is 277 bottles per year (according to information supplied).

Weight and Height of Guam Mothers

The original Chamorro was reported by the Spaniards to be tall. The present day Guam woman is rather short. The weights and heights of 148 Guam mothers were taken from records and field observations.

TABLE 8: Weight and Height of 148 Guamanian Mothers in Age Groups

Age group	16 - 24	25 - 34	35 - 44	45 - 60	16 - 60
Number	47	39	38	17	148
Weight (lbs)	124	130	182	151	139
Height (inches)	61	61	60	60	60

In this group is seen a tendency to increase in weight in middle age; 28 women in the 35 - 44 year group averaged 182 lbs for a height of 60 inches.

It might be interesting to make a further check on the relation of age to weight in women using a larger group. This would help to demonstrate whether this marked obesity in the 35 - 44 year group was a chance observation in this particular series.

The 'ideal' weight for a woman of 'large frame' with a height of 61 inches as quoted by the American Metropolitan Life Insurance Company (Statistical Bureau 1943) was 121 - 131 lbs. These figures were calculated on weighings of subjects in indoor clothing and shoes. It would be hard to claim that Guamanian women had a 'large frame', so the contrast is therefore more striking. It is most apparent to the eye when dealing with groups of middle-aged Guamanian women. Amongst women included in houses visited, cases of varicose veins or mild diabetes were present and the diet recorded will be seen to be predominantly protein and carbohydrate in composition. In a recent study of pregnant Australian women, early weaning and toxaemia was shown to be associated with pre-pregnancy obesity. ("Nutrition studies of pregnant Australian women" - Woodhill, van der Berg, Burke & Stare. American Journal of Obstetrics & Gynecology, 70: 987, 1955).

Anaemias Among Pregnant Women

The public health department holds pre-natal clinics regularly in each municipality, at which prospective mothers are medically examined. Part of the routine tests includes hematocrit and haemoglobin estimations, examination for intestinal parasites and the Kahn test. Seventy charts were taken at random from 11 municipalities situated all over the island in both town and country areas. The results are considered below.

TABLE 9

A.

	Number of samples	Haemoglobin Mg.100/Ml (mean)	Hematocrit volume	Age (mean)	Number of pregnancies	Still births or miscarriages
Haemoglobin 7 to 9.99%	20	9.0	31	31	7.05	.70
Haemoglobin 10 to 11.99%	43	10.75	37	28	5.83	.58
Haemoglobin 12 to 14%	7	12.79	41	27	5.7	.57
	70	10.47	37	29	6	.6

B. A further dissection of the group showing the lowest haemoglobin figures provides data as follows:

Haemoglobins %	Number of samples	Haemoglobin Mg.100/Ml (mean)	Hematocrit volume	Age (mean)	Number of pregnancies	Still births or miscarriages
7 - 8	3	7.7	31	30	8	1
8 - 9	6	8.67	35	29	6	.8
9 - 99	11	9.54	35	32	7	.5

III: THE DIETS OF MOTHERS AND OF CHILDREN

Methods Used in Survey

The semi-urban municipality of Dededo was chosen for one spot survey, while the country municipality of Merizo was chosen as a contrast. In Dededo 15 families were chosen, which was 5% of the total number of 300 families. In Merizo 20 families were chosen from 200 families, giving 10% of the total number. The investigator lived for the period of the survey in a Guamanian Household in the municipality and used a local interpreter to facilitate contact.

Families were first chosen with pregnant and lactating women or small children. There were 7 lactating and 6 pregnant women in the group, the remainder having small infants under 2 years. Next a selection was made to give a range of salary and occupation. In Merizo some fishermen and farmers were chosen. It was found that in both municipalities some families were part-time farmers, or if full-time wage earners, they owned or rented land. In Dededo some families fished several nights a week to augment their food supplies.

TABLE 10: Composition of Families Surveyed by Age and Sex

		Under 1 year	1 - 6	7 - 10	11 - 14	15 - 19	20 +
DEDEDO	Male				3	3	14
	Female	7	28	13	2	2	15
MERIZO	Male	9	48	21	8	5	20
	Female				14	2	20

For each family a record of the members showing sex, age, weight, height, occupation, etc. was established. A typical sample is shown below.

TABLE 11: Family Personal Record

	Age (yrs)	Weight (lbs)	Height (ins)	Notes
Father	29	140	68	Electrician in a private company, earning $160 per month.
Mother	22	122	58	Pregnant
Child (male)	5	38	40	
" (female)	4	33	36	
" (male)	3	31	35	

TABLE 11 (Ctd.)

Owns some land which is visited about once a week. House frame, piped water and electricity, vehicle, radio, washing machine, electric stove and iron. Inside toilet which does not work well. Meal times: 7 a.m. when husband goes to work; 11.30 a.m. for mother and children; 3 p.m. for snack; 5 p.m. for evening meal, and at 9 p.m. another snack.

Women were asked to keep simple records of the daily meals over a period of one week, and methods of food preparation and recipes were noted by the investigator. A typical example of meal record for a family of 5 is given below.

TABLE 12: Typical Record for One Meal of a Family of Five

Breakfast time: 6.45 a.m.

Family	Bread ½ loaf	Butter ½ oz.	½ tin unsweetened condensed milk	Coffee with sugar	Boiled eggs	Fresh oranges
Father	2 slices	1 teaspoon	½ tablespoon	-	2	½
Mother	2 "	½ "	1 "		2	1
1st child (m)	1½ "	½ "	1 "		1	½
2nd " (f)	1½ "	½ "	1½ "		1	½
3rd " (m)	1½ "	½ "	1½ "		1	½

Each house was visited each day, records collected and examined, when necessary portions were weighed and checked. As many foods are purchased by the pound or in can, a fair estimate was obtained both of family food consumption and division within the family from the data. Prices of foods purchased were obtained from local stores and used in compiling records. Notes were made of whether food was purchased or grown, local or imported, fresh or canned.

Food intake was interpreted in terms of nutrient intake using tables given in the U.S. Department of Agriculture Handbooks Nos. 8 and 34. Calculations were based on both "edible portions", and on "as purchased" weights since many foods were used in canned or prepared form. Daily dietary allowances recommended by the Food and Nutrition Board of the National Research Council (1953 revision) have been shown.

No adjustments have been made for size, climate, and activity. Useful as such adjustments may be, their reduction to figures is difficult under the circumstances pertaining to a study such as this, and it was not felt that much value would accrue in this case. Furthermore, it will be appreciated that in the time available, and with the limitations imposed by the fact that the investigator had not at her disposal staff and means of measurement to

ensure completeness of data in every particular case, the figures collected are valuable as indicators rather than as absolute assessments.

For this reason statistical manipulation of the data was limited to the minimum, and the opinions expressed are based on the whole picture. They are intended to be merely fingerposts which can perhaps be useful to the administration in evolving a food policy, suitable to the particular needs and circumstances of this rather specialised community. Nevertheless the conclusions arrived at are as accurate as the inherent qualities of the data allow.

RESULTS

Food Habits and Meal Pattern

Though findings in the two country and urban municipalities visited were treated separately, the differences did not appear to be well enough defined to make it of interest to present separate findings. The most noticeable item was in the quantity of fresh fish eaten in Merizo which is certainly higher than that eaten at Dededo. Merizo has a wide reef and is an excellent fishing centre; local people buy from the fish traps of the professional fishermen or augment their supplies by a little private fishing.

A prominent characteristic of the Guamanian diet is that food habits generally are rapidly changing, and this has been most marked since the last war. This is doubtless greatly due to the establishment of the prevailing wage economy which not only removes the agricultural labourer from the land, but puts into his hand the wherewithal to purchase processed foods, easy to prepare, and usually without much waste.

The tempo of modern community living leaves neither the time, nor as a rule, the desire to return to the old ways and tedious, if leisurely cultivation and preparation of local foods. Rice is a case in point. It is mentioned in the earliest accounts as being grown in Guam, and before the war was grown in the country districts. It is now seldom planted, and its production cannot compete economically with the imported variety.

Another popular Guamanian food probably introduced in the very early days is the tortilla, made from ground corn flour. Occasionally the old and time-consuming method of cooking the fresh dry corn with lime and water, washing it, and grinding it by hand, can still be observed. However, most families now buy an enriched cornflour prepared in the United States, and sold at 55 c. for 5 lbs.

It is, though, hard to generalize. Some families tend to plan their meals on the American pattern, introducing a few local foods and preparations from time to time. Others stick to the old Guamanian pattern introducing the newer foods obtainable to a less extent.

In the families under study and visited during September and October, the weekly food lists consisted mostly of purchased foods, chiefly imported.

The most common foods eaten were rice, bread, tortillas, and to a lesser extent other cereals and grains. Cereals and grains are often incorporated in cans or prepared foods. The amount of starchy root vegetables eaten was comparatively small during the survey period, partly perhaps due to their being out of season.

Every house purchased fresh, canned or preserved meat and canned or fresh fish. All purchased canned milk, and most bought eggs. Candies, sweet cakes and biscuits, and soft drinks were popular especially with children.

There is a tendency to follow the habit of having three meals a day, but there are many exceptions. Shift working, school attendances, and a regular or irregular regime in the home all affect the position. There is probably more feeding or eating "on demand" than is usual in more stable communities.

Special events are as elsewhere the occasion for feasts. "Fiestas" are of more common occurrence than in many communities, and are associated with the distribution of food not consumed to relatives and friends who did not attend.

The exchange of gifts of food between relatives and friends is common, but too irregular to be assessed in a dietary survey. The "esprit de famille" of which this is a manifestation helps in the care of the homeless and aged. Unfortunately, as elsewhere, social change does not seem to maintain and strengthen this spirit, and occasionally hardship and actual food shortage may occur with certain individuals in groups.

Food Costs

Every family under study had an income from wages. The range encountered is wide however, running from $125 to $472 per month. Some persons were known to be part-time workers and employed for part of the year only. The number of persons per family of the group ranged from 2 to 11, and the average amount available per unit per day was $1.80. Of this 92 cents on the average was spent on food leaving 92 cents for other expenses. However, in some cases with lower incomes and large families, 70 - 80% of the income might be spent on food.

It was estimated that the cost per unit per day for an adequate balanced diet was about 75 cents.

It would seem therefore that the average Guamanian could attain an average diet on his income. However, those in low income groups with large families would find difficulty. Furthermore the figures given imply wise spending. Dietary wisdom and a borderline budget do not always go together, though most necessary at that level. It was noticed however that even in cases where the income was adequate, the unwise spending of money on expensive meats, candy, prepared cakes, soft drinks, etc. left insufficient for the purchase of the more expensive but more desirable fruits and vegetables. Furthermore the costs of these articles, whether local or imported, is comparatively high.

Finally, of course, even the wide variety of imported foods available which must or ought to be combined with the use of the traditional foods, makes the matter of choosing an economical yet sufficient diet very difficult.

The Diet of Mothers

The accompanying table (Table 13) gives in summary form the calculated average nutrient values of the diets of 35 individual mothers. As the list of foods eaten was long and varied, summary figures were produced by calculating weights of foods eaten by more than 8 mothers, and averaging this for the group. This enables a manageable detailed table to be constructed showing main types of nutrient, and is the 'typical' diet. In addition however the nutrient content of the actual diet of the 35 mothers was calculated and averaged, and the actual overall average shown.

It should be noted that calculations made assumed the enrichment of wheat flour used for bread, cakes and other make-up foods according to figures given in Agricultural Handbook No.8. These figures are based on the minimum levels for the required nutrients covered by the Federal Enrichment Legislation, which requires that 1 lb. should contain thiamine: 2.0 mg., riboflavin: 1.2 mg., niacin: 16 mg., and iron 13 mg. If this was not the case, the figures for these nutrients would be lower than represented.

Corn meal (white) is known to be degermed and enriched as this is stated on the packets, but flour enrichment could not be ascertained in all cases. Rice appeared to be all white and milled and has been calculated as such.

Comments

The daily calories intake ranged from 1219 to 2632. There is no shortage of foods which provide a good source of calories. Indeed, judging by the average weights of the small sample of women previously mentioned, they are often consumed in amounts far above the body needs.

In comparison with diets in other parts of the Pacific, the protein intake is within reasonable limits and might even be said to be high. One half of three quarters of the average daily intake of 78 gms. came from animal sources. The individual range was from 51 gms. to 115 gms. daily.

Fat provides approximately 20% of the total calories, a good proportion coming from animal sources.

When calculating the vitamin A content of foods in Agricultural Handbook No.8, the "value expressed as micrograms of carotene were converted to I.U. of vitamin A, on the basis that 0.6 microgram of beta carotene and 1.2 micrograms of other carotene having vitamin A activity, were equivalent to one I.U. of vitamin A". The range of individual intakes was 150-4421 I.U. Individual diets which did not include milk, eggs, butter, or green and yellow vegetables and fruits, lowered the average figure. Most diets contain only small amounts of fruits and vegetables.

TABLE 13: Nutrient Content of -

(1) "Typical" dietary intake (foods eaten by 25% or more of subject
(2) Mean of 35 mothers dietary intake (includes full range of foods

Food	Approximate household measure	Average consumption gms/day	Calories	Protein gms	Fat gms	Carbohydrate gms	Calcium mg	Phosphorus
Milk (evaporated unsweetened)	2 tablesp.	63	86	4	5	6	153	12
Eggs	1	50	77	6	5	-	26	10
Meat (canned & fresh)	3 oz.	90	223	17	15	-	9	17
Fish " "	3 oz.	90	173	20	6	-	80	27
Butter, "fats & oils, coconut"	½ oz.	11	87		9			
Fresh citrus fruits (local & imported)		22	10			2	7	
Orange Juice	1/6 cup	42	22			6	4	
Other fresh fruits	½ oz.	15	9			2	1	
Green & yellow vegetables and fruits	1 oz.	30	7			1	28	
Other vegetables	½ oz.	20	8			1		
Starchy root vegetables, breadfruit	¼ root	25	24			6	3	1
Banana	½ fruit	35	29			8	2	
Rice (cooked, unenriched)	2½ cups	413	502	10		110	32	19
Bread (white, enriched)	2 slices	46	126	4	1	23	36	4
Cornmeal (dry white enriched, imported)	1/5 cup	29	105	2	-	22	2	2
Cookies, doughnuts, crackers, sweet rolls, cakes, noodles, vermicelli, pancakes		153	398	8	11	65	86	13
Sugar, jam, candies, sweet beverages		37 +beverage	120		2	43	1	
"Typical" mothers' diet			2016	71	54	295	470	111
Actual mothers' diet: mean nutrient content of 35 mothers' diet			2064	78	50	303	376	
Recommended allowance for women 25 years old 55 kgs (121 lbs), 62 inc., mean external temp. 10°C			2300	55		.8 gm		
Additional allowances for pregnancy (3rd trimester)			400	80		1.5 gm		
Additional allowances for lactation			1000	100		2.0 gm		

From discussion of nutrient content of individual diets, the reasons for any differenc
diets can be seen. 35 mothers include: 6 pregnant, 7 lactating, 22 with small infa

Thiamine may be low in relation to the calories if the calorie intake is high owing to the inclusion of large amounts of milled unenriched rice. Range of daily intake was: .56 mg. to 1.72 mg. The main difference between the lowest and highest diets was that large amounts of enriched bread and corn meal were used in the latter, while the main carbohydrate in the former was white rice. It was noted that orange juice was an appreciable source of thiamine if used in sufficient quantities. The inclusion of pork, ham or bacon was also a reason for high individual thiamine intakes.

Riboflavin intake ranged from .52 mg. to 1.59 mg. Over a period of a week the poorest diet contained only a few tablespoons of milk, no eggs and practically no vegetables or fruits, or fruit juices. The richer diet however had large amounts of eggs, meat, fish, some orange juice and tomato juice and milk, and even a little fresh fruit. Vegetables however were canned in the form of soup. For individuals who do not consume much milk and vegetables and fruit, it is difficult to attain a reasonable daily intake of riboflavin.

The lowest individual amount of niacin was 7.7 mg. and the highest 21.7 mg. The former used mostly white rice as a source of calories and rather small amounts of meat and fish. The latter ate small amounts of white rice, but a large amount of bread and corn meal both calculated as enriched. Satisfactory amounts of fish, and meat, were also included in the diet. The calorie intake of this diet was also high. The intake of niacin seems often to depend on whether there is sufficient meat and fish in the diet, and whether the source of carbohydrate is refined, and if so, whether it is enriched.

Vitamin C diet content varied from 1 mg. to 444 mg. daily. In many cases much of the vitamin came from canned fruit juices. If this was not included, it was often low. The amount of starchy root vegetables was small at the time of visit, so vitamin C mostly came from fruit and vegetables. However, season of year may affect this intake, and it must be remembered that the survey was done at the season when fresh local produce was most scarce.

Iron varied from 6.3 to 17.7 averaging 10.5 mg. The difference in the two extreme diets was mainly due to the relative contribution of enriched and non-enriched carbohydrates, and large and small amounts of meat, fish and eggs.

The individual calcium intake varied from: .139 gms. to 1,153, but was generally low with an average of .376 gms. In the former case the mother did not drink milk because she did not like it. She also had none of the small fish so popular with Guamanians (Admangao) which are eaten with bones. Neither did she eat canned salmon or sardines, though she had rather large amounts of fresh fish. The mother with the highest intake however ate considerable amounts of canned salmon and sardines and some milk. The proportionate rates as between calcium and phosphorus was 1 : 2.5. Though fish with bones, both fresh and canned, is popular, it did not seem to be eaten in large quantities by the groups studied.

It would seem that the average mother's diet is vulnerable in several respects Lack of vegetables and fruits (particularly green and yellow varieties) exclusion of citrus fruits, tomato or fruit juices, and milk makes a big difference to the adequacy of the total nutrient intake. If the carbo-

hydrates forming the main caloric sources are not enriched, the intake of thiamine, iron and riboflavin at least would be affected, and lower than represented in the estimated daily intake.

The Diet of Children

Infants Under One Year: The information given was extracted from records in the health centres at Barragada, Dededo and Merizo, and from personal observation. The figures quoted cover the records of 166 infants during the first year of life.

TABLE 14: The Feeding of 166 Infants Aged One Month

	Barragada	Dededo	Merizo	Total
Mother's milk only	8	23	21	52
Mother's milk and cow's milk	23	21	17	61
Cow's milk only	28	21	4	53
	59	65	42	166

The figures show that by the end of the first month of life approximately one third of infants were being breast fed only, one third were fully weaned, and the remainder were on mixed milk feeding.

It is to be noted that the nearer to the main centre of population the smaller the proportion of breast fed infants. Barragada is nearest to the central populated area; Dededo, somewhat further away; and Merizo quite remote. Yet note that even in the latter case only half the total number of infants were entirely breast fed at the end of the first month.

The reasons for early complementary feeding were difficult to ascertain. The best proof of necessity to complement namely loss of weight of the breast fed infant in the first month was seldom given. Medical reasons such as the anaemia in the mother, debility of the mother, or even pre-pregnancy obesity, might operate in some cases. At this early stage, occurrence of a further pregnancy could clearly not be adduced as a reason. One is inclined to think that changing social patterns and urbanisation are important factors. Possibly outside employment of the mother is the determining factor in many of the fully weaned group.

Further study of the group of 52 infants having mothers' milk alone at one month, showed that by three months, a high proportion were receiving cow's milk (evaporated unsweetened). By 11 months, only three infants in this group were still receiving breast milk, and all three of these were being bottle fed in addition.

There is a great contrast between weaning practices in Guam, and those met with elsewhere in the Pacific where the prevailing tendency is to defer weaning to a much later stage than would be the modern practice in developed countries. The position in Guam would appear to be at the other extreme, however, and weaning to be excessively early in too many cases. It would appear that there is room for further education of mothers in sound weaning theory and practice. It is to be noted in passing too that on account of early weaning and also because the mother does not carry the child about during the day, there is much less casual or 'opportunity' breast feeding than is usual in less sophisticated communities.

The milk used for a bottle feeding is almost entirely evaporated unsweetened milk, and one particular brand is used more than any other. Since refrigeration is usual, and piped water is generally available, this is quite suitable under the circumstances. The mixing of bottle feeds (formula) is well and simply taught; 2 parts of water to 1 part of milk in the first few weeks of life changing rapidly to $\frac{1}{2}$ of milk and $\frac{1}{2}$ of water. Quantities at each feed are increased according to age and weight by the nurse when the mother attends the well-baby clinic. Sugar is not added to the feed. If the child is constipated, corn syrup is added. Care and hygiene of bottle feedings is also taught by the nurses, and their efforts have been rewarded by the lowering of the morbidity rates of diarrhoea or gastro-enteritis.

There is much variation in the routines of feeding as between mothers, and no accepted general pattern. Routines are regular, or irregular as to time in bottle feeding and in respect of breast feeding where this is still being given. The proportions of $\frac{1}{2}$ canned evaporated unsweetened milk to the same amount of water for bottles is usual in the first year, but during the second year quantities may be less carefully measured, and may not be the equivalent of whole milk. Bottles gradually give place to cups in feeding, and while every child in the sample studied had some milk up to six years of age, the amount often seemed too small especially since, with so little fresh fruit and vegetables being consumed, sources of calcium and riboflavin for these young children were limited.

Nurses working in well-baby clinics are guided in the advice they offer to mothers by certain "standing orders" compiled by the physician in charge of the service. These deal with the routine supplementation of the milk diet of the baby, and cover such items as the regular giving of cod liver oil, orange juice, or polyvitamin drops from two weeks after birth. The time and manner of introduction of strained vegetables, cereals, fruits, egg yolk, strained meats, etc. are prescribed and follow the usual patterns.

As in other communities there is in Guam great variability in the faithfulness with which prescribed routines or wise feeding practices are carried out; sometimes this is due to financial or domestic stress, sometimes to maternal inefficiency or ignorance, often to a combination of causes. This can result in a grossly inadequate and ill balanced diet, and evidences of ill-nutrition in the child.

The infants showing the most satisfactory nutrient intakes were those having a good variety of canned, prepared baby foods. These preparations

range from single foods to combination of a large variety of foods. It is worthy of comment that mothers who would never think of preparing home-made mixtures having such a variety of ingredients, will readily give these canned food mixtures to their young children. Nevertheless provided suitable preparations are chosen, and provided the parents can afford the cost (a 4 oz. can for 25 - 35 cents) nothing can be said against their nutritional value.

It might also be remarked that no busy intelligent housewife could or would undertake the multifarious operations involved. For those who cannot afford these canned foods every day, some cheap and nutritious substitutes can be made from common local and imported foods. Often the mixtures can be made by using small amounts of different family foods thus reducing costs. The amounts of different foods used in home mixtures are important and must ensure that the necessary nutrients are provided in adequate amount. Moreover the need for hygienic methods of preparation of home-made mixtures is most important.

Some suggested recipes for these home-made baby food mixtures, based on ingredients available in Guam, have been provided in an appendix to this report.

To summarize the feeding of infants under one year, it may be said that in spite of advice to the contrary the normal pattern is towards very early complementation of the breast, and to complete weaning at an early stage.

Canned evaporated unsweetened milk is used as a substitute for breast milk. The authorities, through their nurses in health centres, give detailed advice regarding supplementary feeding, and the introduction of mixed feeding. As elsewhere the advice is not always closely followed.

Canned prepared baby foods can provide an adequate mixed diet supplement to milk or a substitute when milk is no longer providing a full diet. These are expensive, but home-made substitutes, given hygienic preparation, are satisfactory. There is need for the training of mothers in the essential requirements of baby feeding.

Children From 1 - 3 Years: Children over one year are sometimes given a can of strained baby food, but more often they begin to share the family food. The "typical" and individual mothers' diets have been described. Children eating with the family share these foods. The distribution is a little different as it includes more eggs, canned fruit juice, and milk but less meat and fish than the diet of older children and adults. There are usually very few vegetables for anyone, but a small child may not even be given an appropriate share of what is available.

The daily nutrient intake of 27 individual children aged 1 - 3 years was calculated and compared with National Research Council recommended figures for this group. It is however recognised that the requirements for children at either end of this age range differ widely, and average figures are of much less value than the study of individual diets. The average observed figures for each item were in fact below the recommended standards, and in several cases much below.

A much better picture can be obtained by illustration of the differences in terms of nutrients between a typical "poor" and a typical "good" diet, and these are shown below.

TABLE 15: Comparison of Daily Nutrient Content of "Poor" and "Good" Diets

		Poor diet Age: 2 years	Recommended daily allowance of nutrients (Nat. Res. Council, opus cit)	Good diet Age: 2 years
Calories		961	1200	1510
Proteins	gms.	34	40	57
Fat	"	23		45
Carbohydrate	"	151		
Calcium	"	.242	1	1.596
Iron	mg.	3.7	7	8.7
Vitamin A	I.U.	379	2000	3102
Thiamin	mg.	.32	.6	.55
Riboflavin	"	.47	1.0	1.07
Niacin	"	5.7	6	8.4
Ascorbic acid	"	3	35	55

The "good" diet contained an average of 2 eggs and 2 oz. of meat or fish daily. Orange juice, tomato juice, milk, butter, were included in reasonable quantities. There was more enriched bread than white rice, as well as several pieces of fresh fruit and a daily banana. Candies, ice cream and cakes were included. The "poor" diet contained no eggs, little enriched cereal, and large portions of unenriched white rice. There was no fruit juice or fresh fruit and only about 3 oz. of vegetables for the week. The quantity of meat and fish for one week provided about $1\frac{3}{4}$ oz. daily and the quantity of milk was similar but a little less than that included in the satisfactory diet.

In spite of his unbalanced diet, the child with the poorest intake was active and alert. He was well covered but his muscular development was flabby. He did demonstrate an interesting skin condition on the lower portion of both legs, more marked on the external aspect, and extending on to the top of the feet. The skin was dry, cracked, and lifting off in flakes like sunburnt skin. Each lifting flake had a black edge, and neither the flakes nor the accompanying brown discolouration could be removed by soap and water. The mother stated that her older children had the condition at the same age, but it disappeared as they grew older.

A visiting expert in nutrition, with knowledge particularly of child nutrition in the tropics described it as "mosaic" skin but would not commit himself as to its exact origin, dietary or otherwise. Nevertheless it has some of the characteristics of skin lesions arising as a result of various dietary deficiencies, and in view of the shortage evidenced in the diet, this may be at least part of the explanation. The family was one with a long history of economic stress, and it would appear that the diet was always poor. It might be poorer in this case than the figures indicate. Children about 2 years old if not the youngest are often somewhat neglected, and not quite so able to fend for themselves as when they are older.

Remarks made regarding diets in general apply to the group of children aged 1 to 3 years, with the possible differences indicated earlier suggesting that these young children have on the whole a less wide range of foods than adults.

Children From 4 - 6 Years: The nutrient content of 14 individual children's diets was calculated and the mean and range compared with allowances recommended is shown below.

TABLE 16: Dietary Intake - Children 4 to 6 Years.

Range of weight and height in 4 - 6 year period	Children observed Weight 35 lbs. - 39 lbs. Height 37 ins. - 42 ins.	Average child Weight 18 kilos (40 lbs) Height 109 cms. (43 ins)
	Mean daily nutrient intake of 14 children 4 - 6 years	Daily allowance recommended for children 4 - 6 years
Calories	1177	1600
Protein gms.	43	50
Fat "	27	-
Carbohydrate "	224	-
Calcium "	.269	1.0
Iron mg.	6.3	8
Vitamin I.U.	2183	2500
Thiamin mg.	.50	.8
Riboflavin "	.69	1.2
Niacin "	8.3	8
Ascorbic acid "	29	50

The differences in requirements within this 4 - 6 year group are not so great as within the younger group. There is therefore more value in using an average recommended allowance for purposes of comparison. In the figures shown, the average height and weight of the observed group is less than in the standard group, and this should be borne in mind in estimating the adequacy of diets.

The mean daily calcium content of the group was lower than that of the 1 - 3 year group, due mainly to the fact that the average diet of the older group contained less milk.

Two of the diets had a vitamin A intake much higher than average. The sources were milk, green vegetables and liver. One of these mothers had been taught home economics at the High School and the other one had been a nurse. Both were careful, sensible and conscientious mothers. Mothers of children whose diets were better balanced were often found to have had some simple training in food values and food preparation. Daily amounts of calcium and riboflavin were low and the sources of these nutrients other than milk were limited.

IV: SUMMARY, DISCUSSION AND RECOMMENDATIONS

Summary

This report covers a survey of the environment, the way of life, and in particular the diet, especially that of the women and children of the indigenous people of Guam.

The salient features are that this small population of mixed but predominantly Pacific origin, now subsists in a highly artificial economic environment, where a wage economy replaces the original self-sufficient agricultural economy. The impact of the American way of life has been heavy and sustained on account of the use of the island as a military base carrying a large American population, and providing the Guamanians not only with numerous personal contacts with the military personnel, but also bringing work and wages, which at one and the same time, take from the Guamanian the time to grow his own food, and provide him with the means whereby to purchase imported goods, especially food, but also motor cars, and multifarious household gadgets, whose use itself drives him further from his former way of life.

In effect we are left with a population led, doubtless by desire as well as necessity, into a way of life on an American basic pattern, but not completely integrated thereto largely because it is still somewhat new, and education, training and ways of thought are slowly catching up with it.

The extent of the change in way of life is such that in the 35 typical households whose diet was assessed in detail, all were receiving wage incomes, and none were subsisting on food which they themselves had produced. The food used was only in very small amount grown and processed locally.

In general, the study indicates that there is no overall insufficiency of food, but that there is a scarcity of fresh foods, especially fruit and vegetables, and that for this reason the amount of vitamins and some minerals tended to be low. The average protein intake is relatively high when compared with diets elsewhere in the Pacific.

It was clear, however, that for all groups investigated the quantity range of nutrient intake was very wide, and the generally low average figures indicated that many mothers and their children had insufficient amounts of certain nutrients.

Early weaning of infants raises dietary problems when complementary and supplementary foods have to be given, and also in relation to the introduction of mixed feeding. The proper use of food supplement and substitutes is discussed.

Observations on weight and height of infants and young children show that birth weight in Guam is normal by Western standards and greater than in certain other Pacific areas. There is no point of interest in the average

growth pattern except that birth weight is not quite trebled at one year.

Certain specific matters thought possibly to have nutritional causes were investigated.

Gastro-enteritis among young children had been regarded as requiring investigation as to diet. It appeared, however, that its principal source related more to environmental sanitation than to dietary defect, and that in fact the position was improving following active sanitary measures.

Anaemia among pregnant women tended to be more prevalent in women over 30 who had had more pregnancies than the younger group. Figures were insufficient to draw conclusions as to its average severity.

Discussion

It appears from this survey that such malnutrition as occurs is due, not so much to shortage of food in general, as to three principal causes.

These are :

1. Shortage of fruit and vegetables both local and imported;
2. cost of food in relation to income, and especially as concerns the fruit and vegetable group which tends to be too costly for those on low incomes;
3. lack of knowledge among women of nutritional requirements and the methods whereby a limited income may be laid out to the best advantage.

The remedies to be applied depend on the co-operation of medical, agricultural and educational authorities.

The agricultural department is interested in increasing the locally-grown supply of fruits and vegetables through agricultural extension work, possibly by encouraging individual families to cultivate small market garden plots around their own houses, or by encouraging farmers to produce more, at the same time improving their marketing facilities.

It is necessary, however, to face the fact that home gardening for many reasons cannot be expected to provide for more than a comparatively small number of cases. A market gardening industry is necessary but cannot be expected to provide cheap fruits and vegetables, though it ought to be able to provide them fresh.

The demand for fruit and vegetables will be a continuing one, but it is still important to educate many people in the necessity and use of these

products as desirable and even indispensable items in their diet from the point of view of their own health and nutrition. All this involves teaching, and should bring the agriculture, education and health departments together to provide the required knowledge and to disseminate it.

Adult education in these matters can be given through a variety of community organizations, and directed to the group most likely to use the instruction given, whether in the art of growing vegetables, or in the art of preparing them for table.

But the time to start with this teaching is a good deal further back. If education is the art of teaching children how to be useful members of the community, then running a home and caring for themselves and their dependents is an important part of the education of girls.

Guamanians have reached the stage of development where home economics or home improvement taught in schools would help the Guamanian mother to look after her home and family. She often handles much of the family income when buying food, clothing and other household necessities. She should understand budgeting and wise spending, not only on food, but many other items. She is responsible for the good feeding and care of her family. She must know how to cook and run her house efficiently and tastefully. The importance of hygiene and sanitation, and the planning of her dwelling to obtain this objective and save her time when caring for a large family should be part of her education.

Many of these things can be most efficiently taught in schools, and the public health department work is made much easier if women have been so trained. This point was noted during the house to house visits. Women with a background of this kind served better meals to their families and were more cooperative since they understood the purpose behind the work.

However good the education in home economics at school level, it is clear that it must still remain somewhat academic. Where individual family rather than community family patterns have evolved and where, usually as a linked phenomenon, a society is learning to live under a modern wages economy, the young married woman requires particular and additional attention. Her own educational and cultural background is not traditionally conditioned in new ways, and the newness of circumstances deprives her of much of the help which her own mother could have given her if the ways of life had not changed so rapidly.

The person best fitted to help her is the public health nurse who will primarily be advising her in the matter of baby care. Hence these nurses are often required to deal with the rather complicated problems common to such societies, and whose effective handling necessitates a high degree of training. Wise use of the range of prepared foods on the market is one example of a subject which requires sound training in nutrition before fully adequate advice can be given.

The amount of such training to be given to all public health nurses is a matter for careful thought and planning, but the Health Department should

have at least one Guamanian, whether nurse or ad hoc student, fully trained as a public health nutritionist or dietitian. Such a person could advise on many social problems relating to nutrition and in particular could advise on food budgeting especially in the case of the lower income groups. The dietary needs of sick children, and of pregnant and nursing mothers are also subjects which could form part of her assignment, as would the teaching of the ordinary public health nurses themselves.

Recommendations

The following recommendations are therefore made for the improvement of the dietary and nutritional position in Guam:

That there be set up a joint body comprising representatives of the agriculture, education, and public health services to consider and advise on problems relating to nutrition particularly in respect of

(1) stimulation of production and marketing of locally produced products especially fruit and vegetables at prices within the purchasing power of the lower income groups;

(2) education in home economics especially in relation to nutritional value of foods, the necessities of physical growth and development so far as food is concerned, and the material and economic planning of diets. This education should cover home economics teaching as part of the school curriculum, and also the teaching of adult community groups, especially mothers;

(3) further training of public health nurses in nutrition, diatetics, and home economics to equip them for the handling of individual domestic problems in this field;

(4) provision of a fully trained public health nutritionist or dietician to assist in the implementing of the above and in the general planning of the nutrition programme.

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To Dr. Kennedy and Dr. Niels Poulsen and the staff of the Department of Medical Services who most willingly provided all the necessary facilities, advice and assistance required, I must give a special word of appreciation and thanks. I trust that the report will be of assistance to them in their handling of the difficult nutritional problems which are the responsibility of their Department.

SAMPLE BABY'S MEALS

To Replace Canned Baby Food

RECIPE I - MEAT & VEGETABLES

Ingredients:

Liquid:	(1) Milk, or (2) Water in which vegetables have been cooked, or (3) Gravy of canned meat, or (4) Water	½ cup of one or several of these mixed
A whole egg or egg yolk		
Vegetables:	canned or frozen carrots, green beans & peas, green spinach or tomato. Fresh pumpkin, taro leaves, pumpkin leaves, "kong kong", green baby lima beans, or other suitable dark green or yellow vegetables.	2 - 3 tablespoons of one or more of these vegetables.
Meat:	canned, canned chicken, beef stew or other soft meats, meat paste, liver paste. fresh, fresh chicken meat	2 - 3 tablespoons of one or more of these foods
Thickening:	(1) Baby cereal (2) Corn starch (enriched)	2 tablespoons 1 dessert spoon

Method of Preparation: Collect ingredients, prepare vegetables chosen by cooking if they are fresh. If canned, mash till the vegetables are a fine pulp. Should vegetables have hard skins or seeds, remove them (ex. tomato seeds). If meat is fresh, it must be cooked slowly a long time till very tender. Take canned or fresh cooked meat and chop till very finely divided. If only yolk of egg is used, separate yolk from white. If whole egg is used, beat the egg for a few minutes till white and yolk are mixed.

Take the liquid to be used. The method you use to thicken depends on the cereal. There are many suitable ones, but there are two common examples:

(1) Baby Cereal: Heat the liquid and pour over the beaten egg and baby cereal. It is not necessary to cook the cereal as it already has been cooked before packed. Then add the soft prepared meat and vegetables.

(2) Corn Meal or Cornflour: Always try to buy enriched cereals, baby cereal or cornflour used for making tortillas. Cook over a flame, stirring all the time till boiling. Boil several minutes to be sure starch is completely cooked. Cornstarch is different from baby cereal in this respect. Remove from the flame, and add beaten egg or egg yolk to the hot mixture, but do not boil. Then add prepared meat and vegetables and give to the baby.

Make sure all utensils and foods used are clean and fresh, and free from contact with flies, cockroaches and other insects.

RECIPE II - BEANS, SKIM MILK POWDER, VEGETABLES & FISH

Ingredients:

Liquid	Water or vegetable water	½ - ¾ cup
Beans	Mungo beans (Phaseolus sp.). lima, haricot, or other dried beans	2 tablespoons
Skim milk powder ("Starlak")		3 tablespoons
Vegetables as in Recipe I		2 - 3 tablespoons
Fish	Canned or fresh can be used, if flesh is soft and free from bones and skin. Oily fish should be added with care.	2 - 3 tablespoons

Method of preparation: Cook beans till soft thick soup is formed. Some beans have to be soaked some hours before they are cooked. Add skimmed milk powder, then fish and vegetables. The fish and vegetables must be prepared and mashed as in Recipe I.

RECIPE III - STARCHY ROOT VEGETABLES, BANANA OR RICE, SKIMMED MILK, PEANUT BUTTER AND VEGETABLES

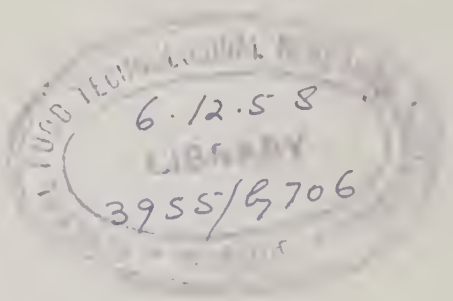
Ingredients:

Root vegetables : or banana, or rice	Sweet potato, or yam, or taro, or potato,	½ cup cooked and mashed

Skimmed milk powder	3 tablespoons
Vegetables as in Recipe I	2 - 3 tablespoons

Peanut butter (1 tablespoon) or 1 egg can be added to this mixture.

Method of Preparation: Collect ingredients. Cook root vegetables and mash till soft and creamy. If rice is used cook till very soft. Take ¾ cup or approximately the quantity the child can eat. If egg is used, add beaten egg while mixture is hot, then skim milk powder, peanut butter and vegetables.



1. Research in Queensland in Tropical Plant and Animal Industries. Jacques Barrau, Technical Officer, South Pacific Commission. May 1953.
3. Social Science Research In The Pacific Islands. November 1956. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)
2. Index Of Social Science Research Theses On The South Pacific. April 1957. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)

)-OPERATIVES

1. The Co-operative Movement in the Gilbert and Ellice Islands. H. E. Maude. February 1949.
2. The Co-operative Movement in Papua and New Guinea. Prepared by the Registry of Co-operative Societies, Port Moresby. February 1953.
4. A Bibliography of Co-operation in the South Pacific. December 1953.
5. Catalogue of the Commission's Co-operative Library (Bibliography of Co-operation). January 1955. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)

)MMUNITY DEVELOPMENT

2. Community Development. March 1950.
3. Interim Reports on the Moturiki (Fiji) Community Development Project. Howard Hayden, Director of Education, Fiji. May 1951.
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JCATION

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MOSQUITO-BORNE DISEASES

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110. Enquete epidemiologique et entomalagique sur la Filariase Bancroft en Nauvelle-Caledonie et dependances. M. Lacau J. Rageau. (With Summary in English). August 1957.
117. La repartition geagraphique des maustiques en Nouvelle-Calec et dependances. J. Rageau. Mars 1958. (Available in French a

TROPICAL CROPS

19. Repart on Capra Grading. November 1951.
21. Nate an the Mycoflara af Rice Seed in the Territaries of the S Pacific. Dr. F. Bugnicaurt, Director, Institut Francais d'Oce Janvory 1952.
31. Cocaa Plantatian Management In Western Samoa. D. R. A. E General Manager, New Zealand Reparation Estates, and W Edwards, Assistant General Manager. October 1952.
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PESTS AND DISEASES OF PLANTS AND ANIMALS

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9. Report af Plant and Animal Quarantine Canference, Suva. 1951.
34. Rhinaceras Beetle Cantral in the Kingdam af Tonga. L. J. Dumbl Plant and Animal Quarantine Officer, South Pacific Commis November 1952.
77. A List af Diseases and Parasites af Animals Recarded in the S Pacific Territaries. Bilingual. December 1954.
78. A List af Plant Diseases Recarded In Sauth Pacific Territ Bilinguol. December 1954.
79. A List af Insect Pests Recarded in Sauth Pacific Territaries. Bilin August 1955. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
101. Parasites And Predatars Intraduced Inta The Pacific Islands Fa Bialagical Cantrol Of Insects And Other Pests. L. J. Dumbl March 1957.
107. The Rhinaceras Beetle In Western Samaa. R. A. Cumber. June 1 (4/- stg., 5/-A., 4/6F., $0.60, 2G.)
116. Contribution a l'Etude des Cachenilles d'Interet Econamique Nauvelle-Caledanie et Dependances, par F. Cahic. Fevrier 1 Available in French only.

ECONOMIC CONDITIONS

54. The Pacific Islander and Madern Cammerce. V. D. Stace, Ass Ecanamist, Reserve Bank af New Zealand. March 1954.
89. Small-Scale Industry far the Sauth Pacific—Preliminary Papers. S. Belshaw. March 1956. (4/- stg., 5/-A., 4/6F., $0.60, 2G.
90. Industrial Activity In Selected Areas af the Sauth Pacific. K. H. D March 1956. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
91. Western Samaa—An Ecanamic Survey. V. D. Stace. June 1956. stg., 7/6A., 6/9F., $0.90, 3G.)
92. Ecanamic Aspects of the Cacanut Industry in the Sauth Pacific. E. Lelart. September 1956. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)

CURRENT RESEARCH

5. Fisheries and Animal Health Research Projects af Significance fo South Pacific Regian, conducted under the autharity of the C.S.I. Australia. May 1950.
29. Current Research in the Sauth Pacific in the Field af Econ Development. July 1952.

* Abbreviations used in the above list for the currencies quoted are: stg. (sterling); A (Australian); F (Fijian); $ (United States dollars (New Guinea guilders).

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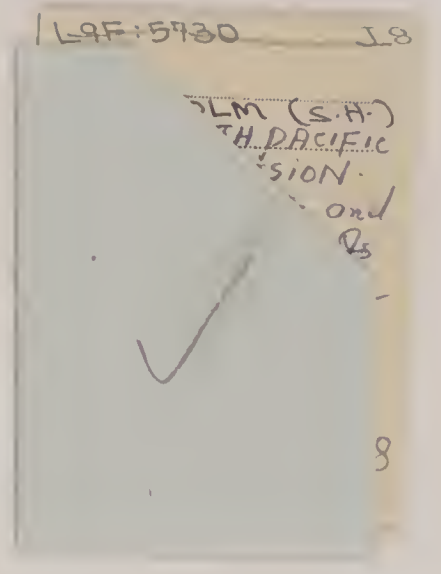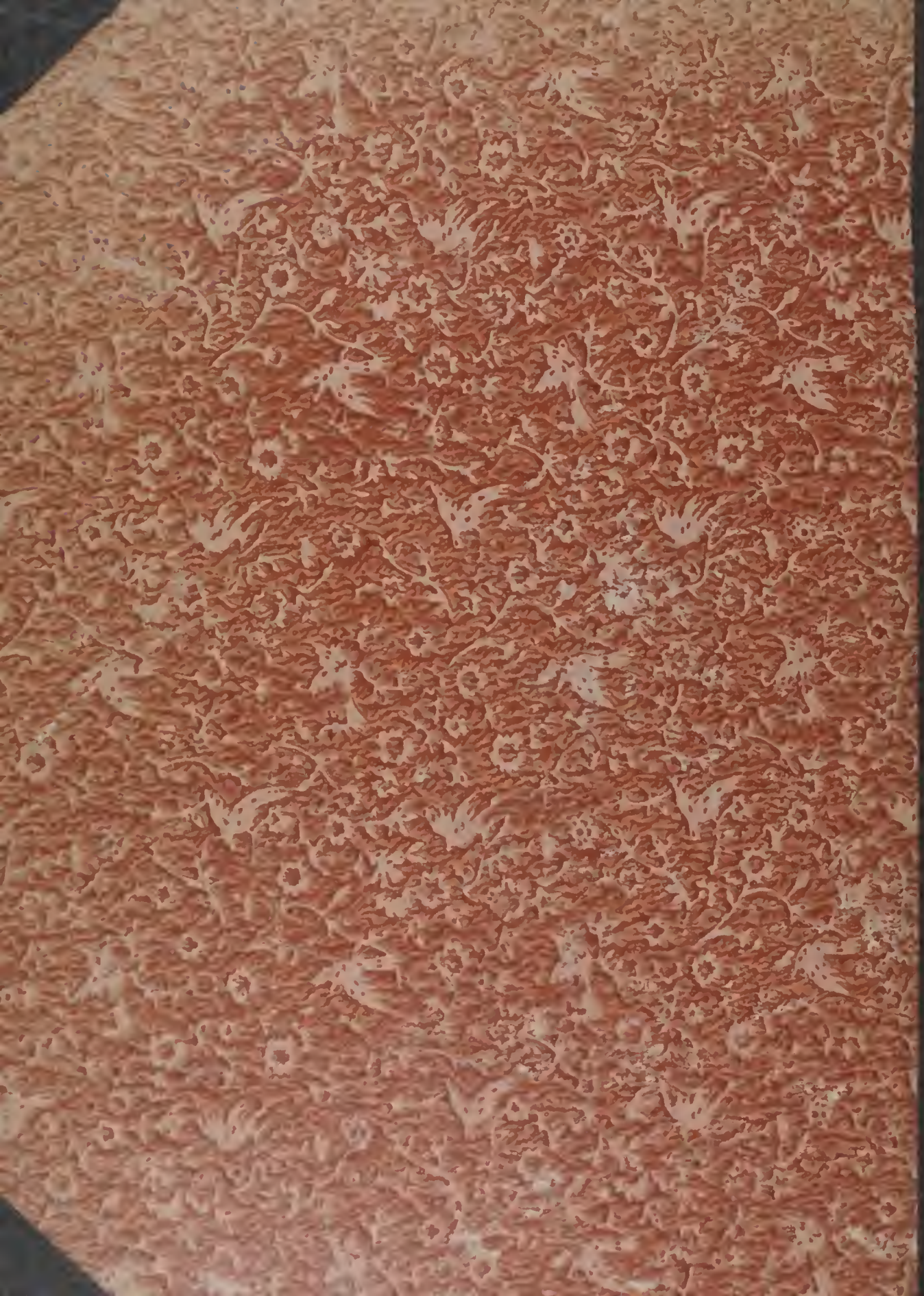
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